

REMARKS

In response to the Office Action dated 1 November 2005, claims 1-5 have been canceled without prejudice or disclaimer, claim 12 has been amended, new claim 14 has been added. No new matter has been added. Reexamination and reconsideration of the claims as requested is respectfully requested.

In paragraph 3 on page 2 of the Office Action, claims 6-7, 9-10 and 12-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0989311 in view of Wagner (US Patent No. 4193434).

In paragraph 4 on page 5 of the Office Action, claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0989311 in view of Wagner (US Patent No. 4193434) and in further view of Hsiao (US Patent No. 6302629).

The claimed invention differs from EP 0989311 in at least the following ways:

- the ring forming the spring element has a plurality of openings,
- the spring element is of lower hardness than the screw element, and
- the spring element has projections in the region of the workpiece contact.

The claimed invention differs from US 4,193,434 ("Wagner") in at least the following ways:

- the spring element is formed on the screw element in one piece,
- the spring element is of lower hardness than the screw element, and
- the spring element has projections in the region of the workpiece contact.

The claimed invention differs from US 6,302,629 81 ("Hsiao") in at least the following ways:

- the screw element has a spring element, and
- all other features related to the spring element are not disclosed in Hsiao disclosure because Hsiao does not teach a spring element at all.

Each of these differences is found in the claims as presented herein.

The claimed invention seeks to provide a screw which is specifically adapted to secure electric or electronic components made of soft materials. To achieve this objective it is important that the device be capable of providing a screw connection which provides means to avoid loosening, and the screw connection provides electrical contact.

A particular problem arising in such specific application is caused by the rather soft material which is part of the screw connection on either one or both sides. Resulting from this, it is not possible to apply high pre-stressing forces because this would damage the component. Additionally, the soft material tends to creep and thus there is a high risk that the screw connection gets loose.

To understand the problem the skilled person is confused when aiming to solve the above problems, it is important to recognize two basically different approaches when seeking to avoid loosening of screw connections:

First, it is important to maintain the pre-stressing effect of the screw connection by including elastic elements into the line of force so that it is prevented from dissipating due to changes in length. In this case, it is required to include at least one elastic element in the line of force and the

screw connection is not allowed to be stiff.

Second, it is known to provide a form of locking effect between the screw head and its underlying surface. A number of geometries are known to achieve this effect but they all are based on a mechanism wherein shaped hatches mounted on the screw head **dig into the counter face** and thus a form locking effect is achieved.

Basically, the second approach is quite attractive for screw connections having soft counter faces because the digging-in could be easily achieved. However, the inventor of the present invention has recognized, that such deep digging-in often produces chips and larger particles which are released out of the counter face and which may severely deteriorate the function of the electronic circuit to which the electronic component is mount.

Thus another approach for securing the soft material of electronic components in a safe manner had to be found. The inventor created as specific screw configuration having a spring element which is specifically adapted for securing soft materials of electronic components. The spring element is **integrally connected** to the screw. By this, the risk that the spring element getting lost in the course of assembling the component is avoided. Further, the force exerted by the spring element is reduced by providing a **plurality of openings** in a ring which forms the spring element. However, it was recognized, that still problems occur when using the such adapted screw.

Thus, an additionally manufacturing step was introduced to **reduce the hardness** of the spring element so that its hardness is **lower than that of the screw** element. By this, a spring element with specific characteristic, in particular with a rather small spring constant can be provided which is of particular advantage for the application.

Such a screw element can safely avoid loosening of the screw connection. However, it was determined that when using such designed screw element, the low forces exerted by the screw element against the counter face often is **not sufficient to remove the oxide layer** or other isolating surface layers so that no electrical contact is provided between the screw, the electrical component and the substrate into which the screw is screwed in.

To overcome this drawback the screw element according to the invention was further improved in that projections are provided on the spring element in the region of the workpiece contact. These projections are adapted to **penetrate through to the oxide** layer of the counter-face or any other isolating layer in order to provide the electrical contact.

As one can appreciate, the thought process of the inventor in this case is contrary adopting the commonly available teaching in the art. Thus it will be important that the prior art specifically identify these contrary teachings in order to comply with MPEP section 2143 to make out a prima facie case for obvious:

2143 Basic Requirements of a Prima Facie Case of Obviousness

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

As will be detailed below, the art of record does not achieve reach this standard.

With regard to the Examiner's objections we want to comment as follows:

The Examiner objects to pending claim 7 to be unpatentable over EP 0 989 311 in view of Wagner, US 4,193,434. EP 0 989 311 and Wagner would disclose all features of pending claim 12 and EP 0 989 311 would disclose a spring element which is of lower hardness than the screw element. We have studied the disclosure of EP 0 989 311 A 1 but could not identify any passage which is directed to the spring element having a *lower hardness* than the screw element. In fact, the hardness of the spring element or

the screw element is not discussed in EP 0 989 311 at all. Beside this, there is a strong indication, that the skilled person would implicitly derive a completely **contrary teaching** (See MPEP sec 2143 above) from the EP 0 989 311 disclosure as to the hardness of the spring element. The reason, why the spring element is usually provided separately from the screw element is to allow for manufacturing the spring element from a specific steel which has a high Young's modules and hardness because this is particularly advantageous for the characteristics of the spring element. Even when manufacturing the spring element in one piece with the screw element the high grade of deformation which is required to form the spring element will result in significantly increased hardness of the spring element when compared with the screw element. To achieve elements of this invention, the inventor experimented to determine whether the elements of the invention would be effective in achieving the objective (thus providing further proof that the invention cannot be made by merely combining random elements in a disparate group of prior art references).

With regard to pending claim 8 defining the spring element to have projections in the region of the work piece contact the Examiner takes the position that this claim would be unpatentable over EP 0 989 311 in view of Wagner and in further view of Hsiao.

To this it should be acknowledged that EP 0 989 311 and Wagner described the above described first approach to avoid loosening of a screw connection by maintaining the pre-stressing effect. In contrast to this, Hsiao discloses the second approach as described above in that specifically shaped projections are provided on the underside of

a rigid ring attached to the screw head, wherein these projections are intended to dig into the counter-face and thus provide a form locking effect.

There is no suggestion to combine these two approaches. In particular, the technical function of the Hsiao screw requires a rigid and stiff ring in order to apply the forces which are required to let the projections dig into the counter-face. In contrast, such stiff and rigid ring could not be used in the screw element disclosed by Wagner or EP 0 989 311 because elasticity of the ring is required to provide the function of these screw connections.

The projections of the invention further are not intended to provide an anti-loosening effect since this is already done by the spring element itself. As said above, the projections of the screw element according to the invention only provide for an electrical contact and *thus do not have to dig into the counter-face as deep as in the Hsiao disclosure*. By this, the production of chips can be avoided by the screw element according to the present invention.

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CONCLUSION

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. The amendments clarify the patentable invention without adding new subject matter. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Michael B. Lasky at (952) 253-4106.

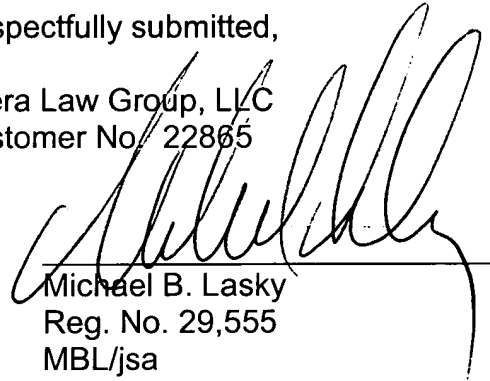
Respectfully submitted,

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3 August 2006

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